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CHABA
FIFTH ANNUAL REPORT
JUNE 1958

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CHABA
FIFTH ANNUAL REPORT
OF THE
ARMED FORCES-NATIONAL RESEARCH COUNCIL
COMMITTEE ON HEARING AND BIO-ACOUSTICS

1 June 1957 to 31 May 1958

Prepared by

Hallowell Davis
Donald H. Eldredge
J. Richardson Usher
of the

Office of the Executive Secretary

Armed Forces-National Research Council
Committee on Hearing and Bio-Acoustics

Office of the Executive Secretary
✓ Central Institute for the Deaf
818 South Kingshighway
St. Louis 10, Missouri

Technical Report No. 15
to the Office of Naval Research
Contract No. Nonr 1151 (01), NR 140-069

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SUMMARY OF THE FIFTH ANNUAL REPORT

The Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics held one full meeting in the year covered by this report. A summary of the meeting is included in this report.

The CHABA Council met three times during the year, and accepted formal or informal reports from eight Working Groups. One new Working Group was appointed, and five Working Groups were discharged. On 31 May, 1958 three Working Groups had active status.

The activities of the CHABA Council and of the several Working Groups are summarized in the body of this report. A cumulative list of CHABA reports and of CHABA material which has appeared in professional journals will be found at the end of the report.

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BY-LAWS OF THE
ARMED FORCES-NATIONAL RESEARCH COUNCIL COMMITTEE
ON HEARING AND BIO-ACOUSTICS

1. The name of this Committee shall be the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics.
2. The purpose of this Committee shall be to consider problems of a scientific and technical nature concerning the direct and indirect effects of acoustic energy (sound, vibration and blast) on man. These problems, among others of a related nature, include:
 - a. Hearing; including auditory physiology, psycho-acoustics, auditory standards;
 - b. Communications, particularly speech communications in noise;
 - c. The psychological and social reactions of man to noise;
 - d. The auditory and non-auditory effects of high-intensity acoustic energy on man;
 - e. The means of protection against the undesirable effects of acoustic energy;
 - f. The relevant physical and engineering problems of the generation, measurement and control of acoustic energy.

In consideration of these problems, the Committee shall collect, collate, and distribute information and may recommend such action as shall be in the national interest.

3. There shall be three classes of members of this Committee: Council Members, Members and Affiliated Members.
 - a. There shall be a Council to consist of nine members appointed as follows: one representative from each of the three Armed Forces; three representatives named by the National Research Council; an Executive Secretary chosen by the other Council members; and such additional members, chosen by the Council, as are required to bring the total to nine. Members of the Council shall normally serve for three consecutive years, or until their successors have been appointed and take office.
 - b. Members of the Committee shall be such additional persons as are appointed by the Armed Forces or the National Research Council. They shall be persons qualified by the nature of their training and experience, or their employment, to contribute to the purposes of the Committee. Normally, one or two representatives of each administrative unit in the Armed Forces having direct cognizance of the problems in hearing and bio-acoustics shall be included. Others shall be engineers and scientists who are

qualified by training, experience, or employment in the fields of acoustics and vibration, psychology, physiology, or medicine. Members of the Committee shall continue to serve at the pleasure of the appointing agency. The Committee will reimburse the civilian National Research Council appointed members for expenses while serving at designated meetings.

c. Other agencies of the government having cognizance of problems in hearing and bio-acoustics, and professional and industrial organizations having similar interests, may be invited at the discretion of the Council to appoint Affiliated Members to the Committee. Except as such Affiliated Members may happen to be Members under paragraph 3b above, they serve as representatives of the agency or organization which shall have appointed them, and the appointing agency shall be responsible for their term of service, replacement, expenses while serving, etc. The appointing agency shall keep the Executive Secretary informed at all times who its authorized representative is.

4. The Council is empowered to take all actions necessary to carry out the work of the Committee except for those actions delegated to the Committee.

a. The Council shall elect a Chairman and a Deputy Chairman from its own members. The Chairman shall preside at all meetings of the Council and of the Committee and exercise the usual duties of a chairman. The Deputy Chairman shall perform the duties of the Chairman in the case of his absence or inability to serve. The term of office of the Chairman and Deputy Chairman shall be two years.

b. The Council shall select an Executive Secretary as provided under paragraph 3a above. The Executive Secretary is empowered to receive and disburse funds for the Committee, to employ technical and professional assistance, to answer routine inquiries in the name of the Committee, and to call, with the concurrence of two other members of the Council, special meetings of the Council. The Executive Secretary shall carry out such projects as the Council shall direct. He shall report on his interim activities at each regular meeting of the Council and shall prepare and distribute to the Council minutes of their meetings, and, at the direction of the Council, reports or publications of the Committee which are necessary or desirable.

c. The Council shall have two regular meetings per year at a time to be agreed upon not later than the last previous regular meeting of the Council. Special meetings may be called, as provided in paragraph 4b, upon not less than five days notice to all Council members.

d. A quorum of the Council shall consist of a majority of the qualified members. Each member of the Council may have a deputy serve in his stead at any meeting which he is unable to attend. A quorum shall require the presence of not less than three regularly appointed members of the Council.

5. The work of the Committee may be carried out in any manner approved by the Council including the following:
 - a. Meetings of the full Committee at which scientific and technical reports may be presented, or problems may be laid before the group for discussion and recommendations.
 - b. The appointment of Working Groups to consider specific issues brought to the Committee, such Working Groups to prepare their findings and recommendations for presentation to the Council.
 - c. The encouragement and sponsorship of publications and other activities which will result in the more effective distribution of our present knowledge about hearing and bio-acoustics.
6. These By-Laws may be amended by two-thirds vote of the regularly appointed members of the Council, following which the changes shall be submitted promptly to the National Research Council and to the Armed Forces for their concurrence.
7. Actions taken at the meeting of representatives of the National Research Council and of the Armed Forces, held at the Bureau of Medicine and Surgery on December 15, 1952 are ratified as enabling action in the formation of this Committee. These By-Laws shall take effect with the appointment of the first six members of the Council.

Statement of Purposes and Methods of Operation

THE ARMED FORCES - NATIONAL RESEARCH COUNCIL COMMITTEE

ON HEARING AND BIO-ACOUSTICS

The Armed Forces - National Research Council Committee on Hearing and Bio-Acoustics (CHABA) was organized late in 1952 to provide a group of informed consultants who could answer questions in the general area of hearing and bio-acoustics. Within its broad scope, CHABA absorbed many functions of the National Research Council's earlier Committee on Hearing. CHABA consults with and advises with the Armed Services in such general areas as:

- 1) Auditory physiology, psycho-acoustics, and auditory standards.
- 2) Communications, particularly speech communications in noise.
- 3) The psychological and social reactions of man to noise.
- 4) The auditory and non-auditory effects of high intensity acoustic energy on man (sound, vibration and blast).
- 5) The means of protection against the undesirable effects of acoustic energy.
- 6) The relevant physical and engineering problems of the generation, measurement and control of acoustic energy.

CHABA activities are supported by funds contributed equally by the Army, the Navy and the Air Force. The Secretariat and the continuing operation of the Committee are provided by the Central Institute for the Deaf under contract with the Office of Naval Research. The Office of Naval Research acts as contracting agent for the three Armed Services.

CHABA IS A RESEARCH ADVISORY ORGANIZATION. IT IS NOT A CONTRACTING AGENCY AND DOES NOT DISPENSE FUNDS. IT MAY, HOWEVER, RECOMMEND THAT RESEARCH ALONG CERTAIN LINES BE CARRIED OUT.

The Council

CHABA's activities are planned and directed by a Council composed of nine members. The Army, Navy, and Air Force each have a Representative, the National Research Council appoints three members, and three members-at-large are chosen by the Council itself. The Council also selects from its membership a Chairman and Deputy Chairman (for two year terms), and an Executive Secretary.

The Council receives the reports of CHABA Working Groups and transmits them through the Secretariat to the requesting agency, either with or without additional comment or endorsement.

The Council usually meets three times a year.

The Committee

The full Committee on Hearing and Bio-Acoustics consists of about one hundred and twenty regular members, of which about thirty-seven are civilians appointed by the National Research Council. The latter appointments include "engineers and scientists who are qualified by training, experience, or employment in the fields of acoustics, vibrations, psychology, physiology, or medicine." Several government agencies with interests in this general area appoint about fifteen affiliated members to the Committee for liaison purposes. In appointing its committee members the National Research Council (NRC) receives suggestions from the CHABA Council but is not bound by them. The common objective is to appoint a group of members who will adequately represent the several current CHABA interests and also those which can be reasonably foreseen. The Committee is purposely kept limited in size and a policy of slow rotation of membership has been adopted.

The Committee meets annually, usually in October in the Washington area. The meetings are restricted to the actual CHABA membership, and specially invited guests, in order to preserve an intimate atmosphere of free discussion. A Committee member is expected to attend this meeting and take part in discussions of those topics in which he is an expert. Except for travel expenses in connection with attending meetings, NRC members serve without financial compensation unless they are asked to serve on one of the Working Groups.

Working Groups

The major work performed by CHABA is accomplished by Working Groups composed of committee members, often supplemented by invited consultants or former members. Working Groups are formed to work on problems brought to the Council by the representatives of the three Armed Services. National Research Council members of the Working Groups are paid for their time spent on work in these groups and are provided travelling expenses. The Council selects the membership of these groups on the basis of the fields of knowledge which should be represented in the solution to the problem. When a Working Group has prepared its report, the Council has the responsibility of accepting and transmitting it to the requesting agency either with or without additional comment or endorsement.

The Secretariat

The Executive Secretary and his staff provide continuity of activity between meetings of the Council. Either alone or with the advice of other specialists and subject to later endorsement by the Council, they may answer questions from the Armed Services that do not require the appointment of a Working Group. They also make the arrangements for the Committee, Council and Working Group meetings. They edit and prepare the various CHABA reports for distribution and/or publication.

The Secretariat is at present located at the Central Institute for the Deaf, 318 South Kingshighway, St. Louis 10, Missouri, and is composed of members of the staff of that institution. Under the terms of the contract with the Office of Naval Research, the Secretariat and Central Institute for the Deaf conduct the financial affairs of CHABA,

subject to the approval of the ONR Scientific Officer. Hallowell Davis, M.D., is Executive Secretary. Donald H. Eldredge, M.D., is Technical Aide, and the Secretary for the Working Groups is J. Richardson Usher, Ph.D.

Distribution of Reports

Working Group Reports, Reports of Annual CHABA Meetings and any other CHABA Technical Reports are prepared by the Secretariat and distributed to the CHABA membership and to a Department of Defense mailing list furnished by the Scientific Officer in the Office of Naval Research. Reports that are of sufficiently general interest usually will be published in scientific periodicals. These reports are also available for general distribution through:

Office of Technical Services
Technical Information Branch
Department of Commerce
Washington, D.C.

and, for those eligible for the service, through:

Armed Services Technical Information Agency
Document Service Center
Knott Building
Dayton, Ohio

Consulting Service

Requests for CHABA advice and questions directed to CHABA are submitted through the Armed Service Representatives on the Council. These are:

ARMY:

Charles S. Gersoni, Colonel, (MSC) USA
Department of Physical Standards Research
Walter Reed Army Institute of Research
Walter Reed Army Medical Center
Washington 25, D.C.

NAVY:

Clifford P. Phoebus, Captain, (MC) USN
Special Assistant for Bio Sciences
Office of Naval Research
Department of the Navy
Washington 25, D.C.

AIR FORCE:

Paul A. Campbell, Colonel USAF (MC)
USAF School of Aviation Medicine
Randolph Air Force Base
Randolph Field, Texas

Liaison with the National Research Council is through the Executive Secretary of the Division of Anthropology and Psychology of the National Research Council. He is:

Dr. Glen Finch
Executive Secretary, Division of
Anthropology and Psychology
National Academy of Sciences-National
Research Council
2101 Constitution Avenue
Washington 25, D.C.

CHABA activities are of interest to the Divisions of Physical Sciences, Medical Sciences, Anthropology and Psychology, Engineering and Industrial Research, and Biology and Agriculture of the National Research Council.

MEMBERSHIP LIST

1 June 1957 - 31 May 1958

THE COUNCIL

NRC Appointees

Dr. Gordon Hoople
1100 East Genesee Street
Syracuse 10, New York

Committee: '53, '54, '55;
Council: '56, '57, '58

Dr. Frederick V. Hunt
Division of Engineering & Applied
Physics
Harvard University
Cambridge 39, Massachusetts

Committee: '56;
Council: '57, '58, '59

Dr. William D. Neff
Section of Bio-Psychology
Faculty Exchange
University of Chicago
Chicago 37, Illinois

Committee: '53, '54;
Council: '55, '56, '57;
Chairman: '57-'58

Army Representative

Col. Charles S. Gersoni
(MSC) USA
Department of Physical Standards
Research
Walter Reed Army Institute of
Research
Walter Reed Army Medical Center
Washington, D. C.

Designated: Committee,
3 Sept. '54;
Council: 24 Oct. '55

Navy Representative

Capt. Clifford P. Phoebus
(MC) USN
Special Assistant for Bio-Sciences
Office of Naval Research
Department of the Navy
Washington, D. C.

Designated: Committee,
10 Mar. '53;
Council: 18 Oct. '54;
Chairman: '55-'56

Air Force Representative

Col. Paul A. Campbell
USAF (MC)
USAF School of Aviation Medicine
Randolph Air Force Base
Randolph Field, Texas

Designated: 8 Nov. '56

Alternate Council Representative:

Col. Charles H. Roadman
USAF (MC)
Chief, Human Factors Division
Directorate of Research and
Development
Office, Deputy Chief of Staff
Headquarters, United States
Air Force
Washington 25, D.C.

Designated 16 Sept. '55

Members at Large

Dr. Hallowell Davis
Central Institute for the Deaf
818 South Kingshighway
St. Louis 10, Missouri

Executive Secretary, '53,
'54, '55, '56, '57, '58

Dr. J. C. R. Licklider
Bolt, Beranek and Newman
50 Moulton Street
Cambridge 38, Massachusetts

Committee: '54, '55, '56;
Council: '57, '57, '59

Dr. T. L. K. Smull
National Advisory Committee
for Aeronautics
1512 H Street, N.W.
Washington 25, D.C.

NACA Affiliate Member, from
22 June '53;
Council: '55, '56, '57

Technical Aide

Dr. Donald H. Eldredge
Central Institute for the Deaf
818 South Kingshighway
St. Louis 10, Missouri

February, 1953

NRC Liaison Officer

Dr. Glen Finch
Executive Secretary
Division of Anthropology and Psychology
National Academy of Sciences
National Research Council
2101 Constitution Avenue
Washington, D.C.

ONR Scientific Officer

Dr. Richard Trumbull
Head, Physiological Psychology Branch
Office of Naval Research
Department of the Navy
Washington 25, D.C.

Designated 15 Nov. '54

Secretary to the Working Groups

J. Richardson Usher
Central Institute for the Deaf
818 South Kingshighway
St. Louis 10, Missouri

October, 1955

THE COMMITTEE

National Research Council Appointed Members

One-year appointments
beginning with 1 July

Dr. Harlow Ades
U.S. Naval School of Aviation
Medicine
U.S. Naval Air Station
Pensacola, Florida

'55, '56, '57

Dr. Leo L. Beranek
Bolt, Beranek and Newman
50 Moulton Street
Cambridge 38, Massachusetts

'55, '56, '57

Dr. R. H. Bolt
Acoustics Laboratory
Massachusetts Institute of
Technology
Cambridge 39, Massachusetts

Chairman: '53, '54;
Deputy Chairman: '55, '56;
Committee: '57

Dr. Paul Borsky
National Opinion Research Center
University of Chicago
100 Fifth Avenue
New York 11, N.Y.

'57

Dr. Raymond Carhart
School of Speech
Northwestern University
Evanston, Illinois

'53, '54, '55, '56, '57

Dr. James P. Egan
Hearing and Communication
Laboratory
Indiana University
Bloomington, Indiana

'57

Dr. Edmund P. Fowler, Jr.
Department of Otolaryngology
College of Physicians and Surgeons
Columbia University
630 West 168th Street
New York 32, New York

'56, '57

THE COMMITTEE

National Research Council Appointed Members

One-year appointments,
beginning with 1 July

Dr. Frank Geldard University of Virginia Charlottesville, Virginia	'57
Dr. Aram Glorig 111 North Bonnie Brae Los Angeles 26, California	Army Council Representative: 11 Mar. '53 to 15 Dec. '54; NRC member: '55, '56, '57
Dr. Thrift G. Hanks Director of Health and Safety Boeing Airplane Company Seattle 24, Washington	'56, '57
Dr. Howard C. Hardy Suite 347 22 West Madison Street Chicago 2, Illinois	'56, '57
Mr. John K. Hilliard Altec-Lansing Corporation 9356 Santa Monica Boulevard Beverly Hills, California	'56, '57
Dr. Ira J. Hirsh Central Institute for the Deaf 818 South Kingshighway St. Louis 10, Missouri	'55, '56, '57
Dr. Uno Ingard Acoustics Laboratory Massachusetts Institute of Technology Cambridge 39, Massachusetts	'56, '57
Dr. Lloyd A. Jeffress Defense Research Laboratory The University of Texas Austin 12, Texas	'56, '57
Dr. George A. Miller Psychological Laboratories Memorial Hall Harvard University Cambridge 38, Massachusetts	'53, '54, '55, '56, '57
Mr. Matha M. Miller Chief, Acoustics Section Douglas Aircraft Co. Santa Monica, California	'57

THE COMMITTEE

National Research Council Appointed Members

One-year appointments,
beginning with 1 July

Dr. Edwin B. Newman Psychological Laboratories Memorial Hall, Harvard University Cambridge 38, Massachusetts	Council: '53, '54; Committee: '55, '56, '57
Dr. Nello Pace Department of Physiology School of Medicine University of California Berkeley, California	'57
Dr. Gordon E. Peterson Department of Speech Frieze Building University of Michigan Ann Arbor, Michigan	'55, '56, '57
Prof. Walter A. Rosenblith Research Laboratory of Electronics Room 20B-221 Massachusetts Institute of Technology Cambridge 39, Massachusetts	Committee: '53, '54; Council: '55, '56; Committee: '57
Dr. Wayne Rudmose Southern Methodist University Dallas 5, Texas	'54, '55, '56, '57
Dr. Isadore Rudnick Department of Physics University of California Los Angeles 24, California	'53, '54, '55, '56, '57
Mr. Vincent Salmon Manager, Sonics Section Department of Physics Stanford Research Institute Menlo Park, California	'56, '57
Dr. Newell D. Sanders Chief, Physics Division Lewis Flight Propulsion Laboratory 21000 Brookpark Road Cleveland 11, Ohio	'56, '57
Dr. Harold F. Schuknecht Henry Ford Hospital Detroit 2, Michigan	'55, '56, '57

THE COMMITTEE
National Research Council Appointed Members

One-year appointments,
beginning with 1 July

<p>Dr. Arnold M. Small Chief, Reliability, Human Factors and Acoustics Convair, P.O. Box 1950 San Diego 12, California</p>	<p>'56, '57</p>
<p>Dr. Kenneth N. Stevens Acoustics Laboratory Massachusetts Institute of Technology Cambridge 39, Massachusetts</p>	<p>'56, '57</p>
<p>Dr. S. S. Stevens Psycho-Acoustics Laboratory Memorial Hall, Harvard University Cambridge 38, Massachusetts</p>	<p>'53, '54, '55, '56, '57</p>
<p>Dr. Peter J. Westervelt Brown University 180 Hope Street Providence, Rhode Island</p>	<p>'57</p>
<p>Dr. Josef Zwislocki Special Education Building 805 South Crouse Ave. Syracuse 5, N. Y.</p>	<p>'57</p>

ARMY DESIGNATED MEMBERS

<p>Major James . Albrite (MC) USA Director, Audiology and Speech Correction Center Walter Reed Army Medical Center Washington 12, D.C.</p>	<p>Designated Council, 4 Jan. '55, Relieved 24 Oct. '55; Committee 24 Oct. '55</p>
<p>Col. William H. Byrne, (MC) Surgeon U.S. Army Aviation Center Fort Rucker, Alabama</p>	<p>Designated 14 Feb. '58</p>
<p>Dr. R. L. Cramer Army Medical Research Laboratory Fort Knox, Kentucky</p>	<p>Designated 25 Nov. '55</p>
<p>Capt. John L. Fletcher (MSC) USA Psychology Department Army Medical Research Laboratory Fort Knox, Kentucky</p>	<p>Designated 25 Nov. '55</p>

ARMY DESIGNATED MEMBERS

Dr. Robert Galambos
Neuropsychiatry Division
Army Medical Service Graduate
School
Walter Reed Army Medical Center
Washington 12, D.C.

NRC Member '53, '54;
Army Member '55

Mr. F. Thomas Galloway
Supervisor, Psycho-Acoustic Section
Audiology and Speech Correction
Center
Walter Reed Army Hospital
Washington 12, D.C.

Designated 11 Sept. '57

Dr. Henry F. Gaydos
QM Research and Development Command
Natick, Massachusetts

Designated 10 Aug. '56

Dr. Warren H. Teichner
QM Research and Development Command
Natick, Massachusetts

Designated 10 Aug. '56;
Relieved 16 Oct. '57

Alternate:

Dr. E. Ralph Dusek
QM Research and Development Command
Natick, Massachusetts

Designated 22 Jan. '58

Col. John R. Hall, Jr. (MC) USA
Chief, Occupational Health Branch
Preventive Medicine Division
Office of the Surgeon General
Room 2522, Main Navy Building
Washington 25, D.C.

Designated 27 Sept. '55

Colonel Charles Hill USA
Human Resources Research Branch
R & D Division
Office of the Surgeon General
Department of the Army
Washington 25, D.C.

Designated 19 July '57

Dr. Merle L. Lawrence
Institute of Industrial Health
University of Michigan
4506 Kresge Medical Research Bldg.
Ann Arbor, Michigan

Designated 28 Sept. '56

Dr. Nicholas B. Louis
Human Research Unit No. 1, CONARC
The Armored Center
Fort Knox, Kentucky

Designated 11 Mar. '53;
Relieved 3 Sept. '54;
Designated 29 Oct. '56

ARMY DESIGNATED MEMBERS

<p>Col. C. B. Meador (MC) USA Department of Physical Standards Research Walter Reed Army Institute of Research Walter Reed Army Medical Center Washington, D.C.</p>	<p>Designated 25 Nov. '55</p>
<p>Dr. David McK. Rioch Technical Director, Neuropsychiatry Division Army Medical Service Graduate School Walter Reed Army Medical Center Washington 12, D.C.</p>	<p>Designated 28 Dec. '53</p>
<p>Mr. Arthur Riopelle Army Medical Research Laboratories Fort Knox, Kentucky</p>	<p>Designated 19 July '57</p>
<p>Dr. R. Edwin Shutts Chief Supervisor Audiology and Speech Correction Center Walter Reed Army Medical Center Washington 12, D.C.</p>	<p>Designated 4 Jan. '55</p>
<p>Dr. Philip I. Sperling Human Resources Branch Research and Development Division Department of the Army Washington 25, D.C.</p>	<p>Designated 24 Oct. '56</p>
<p>Dr. John Weisz Human Engineering Laboratory Aberdeen Proving Ground, Maryland</p>	<p>Designated 5 May '57</p>
<p>Mr. Maurice B. Whitlock, Jr. Audiology and Speech Correction Center Walter Reed Army Medical Center Washington 12, D.C.</p>	<p>Designated 31 Mar. '55</p>

AIR FORCE DESIGNATED MEMBERS

<p>Dr. Charles W. Bray Hq., Human Resources Research Center Attn: DCS/O Lackland Air Force Base San Antonio, Texas</p>	<p>Designated 9 May '53</p>
---	-----------------------------

AIR FORCE DESIGNATED MEMBERS

Mr. Francis A. Brogan
USAF School of Aviation Medicine
Randolph Air Force Base
Randolph Field, Texas

Designated 7 July '53

Col. J. C. Carmichael USAF (MSC)
Hq., Air Materiel Command
Attn: MCDPE
Wright-Patterson Air Force Base,
Ohio

Designated 21 Sept. '55

Dr. Julien Christensen
Commander
Wright Air Development Center
Attn: WCRDP, Dr. Julien Christensen
Wright-Patterson Air Force Base,
Ohio

Designated 9 May '53

Deputy Member:
Dr. Harry J. Jerison
Address:
Commander
Wright Air Development Center
Attn: WCRDP, Dr. Harry J. Jerison
Wright-Patterson Air Force Base,
Ohio

Designated 10 Oct. '54;
Relieved 25 Oct. '57

Mr. D. A. Dickey
Address:
Commander
Wright Air Development Center
Attn: WCLB, Mr. D. A. Dickey
Wright-Patterson Air Force Base, Ohio

Designated 9 May '53

Deputy Member:
Mr. Allan Watton, Jr.
Address:
Commander
Wright Air Development Center
Attn: WCLBS, Mr. Allan Watton, Jr.
Wright-Patterson Air Force Base,
Ohio

Designated 9 May '53

Col. G. K. Fair USAF
Chief, Aviation Medicine Division
Office of the Surgeon General
Hq., United States Air Force
Washington 25, D.C.

Designated 9 Sept. '55

Lt. Col. Gordon F. Fisher USAF (MC)
Preventive Medicine Division
Office of the Surgeon General, USAF
Washington 25, D.C.

Designated 19 July '57

AIR FORCE DESIGNATED MEMBERS

Col. Jay F. Gamel USAF (MC)
Office of the Surgeon (MCD)
Hq., Air Materiel Command
Wright-Patterson Air Force Base,
Ohio

Designated 24 Sept. '53

Dr. H. E. von Gierke
Address:
Commander
Wright Air Development Center
Attn: WCLDN, Dr. H. E. von Gierke
Wright-Patterson Air Force Base,
Ohio

Designated 9 May '53

Deputy Member:
Major Elizabeth Guild USAF
Address:
Commander
Wright-Patterson Air Force Base,
Ohio

Designated 9 May '53

Dr. Frank W. Hartman
Medical Research Advisor, AFCSG-10,2
Directorate of Professional Services
Office of the Surgeon General, USAF
Washington 25, D.C.

Designated 31 July '56

Dr. A. W. Hetherington
Hq., Air Research and Development
Command
P.O. Box 1395, Attn: RDDH-2
Baltimore, Maryland

Designated 9 May '53

Dr. C. M. Kos
Professor, Department of
Otolaryngology and Maxillo-
facial Surgery
University Hospitals
State University of Iowa
Iowa City, Iowa
(National Consultant, Consultants
Group
Office of the Surgeon General
Hq., United States Air Force
Washington 25, D.C.)

Designated 9 Sept. '55

Lt. Col. Ralph N. Kraus USAF (MC)
USAF School of Aviation Medicine
Randolph Air Force Base
Randolph Field, Texas

Designated 30 June '55

AIR FORCE DESIGNATED MEMBERS

Dr. Karl Kryter AF Operational Applications Laboratory Air Force Cambridge Research Center Bolling Air Force Base Washington 25, D.C.	Designated 9 May '53; Relieved 17 Oct. '57
Dr. Irwin Pollack AF Operation Applications Laboratory AF Cambridge Research Center Bolling Air Force Base Washington 25, D.C.	Designated 9 May '53
Deputy Member: Dr. Walter O. Spieth AF Operational Applications Laboratory AF Cambridge Research Center Bolling Air Force Base Washington 25, D.C.	Designated 21 Feb. '58
Lt. Col. Phillip J. Maher, Jr. USAF (MSC) Hq., United States Air Force Attn: AFDRD-HF Washington 25, D.C.	Designated 9 May '53; Relieved 17 Oct. '57
Lt. Col. Alvin F. Meyer, Jr. USAF (MSC) Office of the Surgeon Hq., Strategic Air Command Offutt Air Force Base, Nebraska	Designated 9 May '53
Mr. C. M. Michaels Address: Commander Wright Air Development Center Attn: WCLPO, Mr. C. M. Michaels Wright-Patterson Air Force Base, Ohio	Designated 24 Sept. '56
Lt. Col. C. N. Moss USAF (MC) Industrial Medical Officer Preventive Medicine Division Office of the Surgeon General Hq., United States Air Force Washington 25, D.C.	Designated 9 Sept. '56
Dr. Horace O. Parrack Address: Commander Wright Air Development Center Attn: WCLDV, Dr. Horace O. Parrack Wright-Patterson Air Force Base, Ohio	Designated Council: Feb. '53; Relieved 8 Nov. '56. Designated Committee: 8 Nov. '56.

AIR FORCE DESIGNATED MEMBERS

Lt. Col. John F. Pierce USAF
Preventive Medicine Division
Office of the Surgeon General
Hq., United States Air Force
Washington 25, D.C.

Designated 21 Sept. '56

Mr. Edward Poth
Sanitary & Industrial Hygiene
Engineering Branch
USAF Dispensary
Kelly Air Force Base
San Antonio, Texas

Designated 9 May '53

Dr. O. R. Rogers
Address:
Commander
Wright Air Development Center
Attn: WCLSY, Dr. O. R. Rogers
Wright-Patterson Air Force Base,
Ohio

Designated 9 May '53

Major R. F. Thompson USAF (MSC)
Address:
Commander
Wright Air Development Center
Attn: WCRDV, Major R. F. Thompson
Wright-Patterson Air Force Base,
Ohio

Designated 9 Sept. '55

Mr. Weiant Wathen-Dunn
Air Force Cambridge Research Center
L. G. Hanscom Field
Bedford, Massachusetts

Designated 9 May '53

NAVY DESIGNATED MEMBERS

Capt. Norman L. Barr (MC) USN
Bldg. 7, Room 7107
Bureau of Medicine and Surgery
Potomac Annex
Washington 25, D.C.

Designated 4 June '56

Dr. John W. Black
Department of Speech
Ohio State University
Columbus, Ohio
(U.S. Naval School of Aviation Medicine
U.S. Naval Air Station
Pensacola, Florida)

Designated 16 Mar. '53

Alternate:
Dr. Gilbert Tolhurst
U.S. Naval School of Aviation
Medicine
U.S. Naval Air Station
Pensacola, Florida ,

Designated 24 Nov. '54

NAVY DESIGNATED MEMBERS

Dr. J. T. Dailey Designated 29 Jan. '53
 Technical Director, Research Division
 Bureau of Naval Personnel
 Department of the Navy
 Washington 25, D.C.

Alternate:

Mr. Victor Fields Designated 29 Jan. '53
 Assistant Head,
 Classification and Survey Research
 Branch
 Bureau of Naval Personnel
 Department of the Navy
 Washington 25, D.C.

Mr. William J. Finney Designated 11 Mar. '53
 Naval Research Laboratory
 Washington 25, D.C.

Dr. Robert S. Gales Designated 5 Mar. '53
 Head, Psychophysics Branch
 Human Factors Division
 U.S. Navy Electronics Laboratory
 San Diego 52, California

Lt. Cdr. David E. Goldman (MSC) USN Designated 11 Mar. '53
 Scientific Liaison Officer
 Office of Naval Research
 Navy 100, Box 39
 Fleet Post Office, New York, N.Y.

Cdr. Alan D. Grinstead (MSC) USN Designated 19 Sept. '55
 Aviation Medicine Division, Code 537
 Bureau of Medicine and Surgery
 Department of the Navy
 Washington 25, D.C.

Dr. Fred Harbert Designated 13 Dec. '55
 Professor of Otolaryngology
 Jefferson Medical College
 1025 Walnut Street
 Philadelphia 7, Pennsylvania

Dr. J. Donald Harris Designated 11 Mar. '53
 Head, Sound Branch Research Division
 U.S. Naval Medical Research Laboratory
 U.S. Naval Submarine Base
 New London, Connecticut

Alternate:

Dr. Richard H. Ehmer Designated 27 Oct. '55
 U.S. Naval Medical Research
 Laboratory
 U.S. Naval Submarine Base
 New London, Connecticut

NAVY DESIGNATED MEMBERS

Mr. David C. Hughes
Bureau of Ships (Code 375)
Department of the Navy
Washington 25, D.C.

Designated 21 Aug. '57

Mr. John F. Hyland
Bureau of Ships (Code 565E)
Department of the Navy
Washington 25, D.C.

Designated 5 July '56

Alternate:

Mr. Walter K. Dau
Ship Technical Division
Bureau of Ships (Code 565E)
Department of the Navy
Washington 25, D.C.

Designated 11 Oct. '54

Cdr. W. L. Jones (MC) USN
Room 1 W45, "W" Building
Department of the Navy
Washington 25, D.C.

Designated 13 Jan. '56

Dr. Elias Klein
Naval Research Laboratory
Code 5104
Washington 25, D.C.

Designated 8 July '57

Mr. Emanuel S. Mendelson
Head, Human Engineering Division
Naval Air Materiel Center, NAES
Philadelphia 12, Pennsylvania

Designated 11 Mar. '53

Mr. Aubrey W. Pryce
Head of Acoustics Branch (Code 411)
Earth Sciences Division
Office of Naval Research
Department of the Navy
Washington 25, D.C.

Designated 23 Aug. '56

Dr. Clifford P. Seitz
Special Devices Center
Sands Point
Port Washington, New York

Designated 2 April '53

Capt. L. B. Shone (MC) USN
Preventive Medicine Division
Bureau of Medicine and Surgery
Department of the Navy
Washington 25, D.C.

Designated 20 July '55

Cdr. J. Siegel (MSC) USN
Preventive Medicine Division
Bureau of Medicine and Surgery
Department of the Navy
Washington 25, D.C.

Designated 20 July '55

NAVY DESIGNATED MEMBERS

Dr. John C. Webster, Code 2124
U.S. Navy Electronics Laboratory
San Diego 52, California

Designated 27 April '56

AFFILIATED MEMBERS

<u>Organization</u>	<u>Member</u>	<u>Appointment Date</u>
British Joint Services Mission	Wing Cdr. J. Howitt British Joint Services Mission Air Force Staff 1800 K Street NW Washington, D.C.	1 April '57
Canadian Defence Research Board	Dr. W. J. McNally 1509 Sherbrooke Street West Montreal 25, Quebec, Canada Alternate: Dr. Keith K. Neely Defence Research Medical Laboratories P.O. Box 62, Postal Station K Toronto 12, Canada	31 May '55
Canadian Joint Staff	Wing Cdr. J. C. Wickett Staff Officer, Medical Services (Air) Canadian Joint Staff 2450 Massachusetts Avenue, NW Washington 8, D.C.	9 Feb. '54
Civil Aeronautics Administration	Mr. Malcolm Y. McCormick Department of Commerce Civil Aeronautics Administration Washington, D.C. Alternate: Mr. S. H. Rolle Power Plant Branch Civil Aeronautics Administration Washington, D.C.	22 July '53 22 July '53
Civil Aeronautics Board	Mr. John M. Chamberlain Director, Bureau of Safety Regulation Civil Aeronautics Board Washington 25, D.C.	11 June '53
Federal Housing Authority	Mr. Marshall L. Ware Chief, Home Mortgage and Subdivision Unit Room 1005, Lafayette Bldg. 811 Vermont Avenue Washington 25, D.C.	28 Feb. '57

AFFILIATED MEMBERS

<u>Organization</u>	<u>Member</u>	<u>Appointment Date</u>
National Advisory Committee for Aeronautics	Dr. T. L. K. Smull National Advisory Committee for Aeronautics 1512 H Street NW Washington 25, D.C.	22 June '53; Council '55
National Bureau of Standards	Dr. Richard K. Cook National Bureau of Standards Washington 25, D.C.	12 June '53
U.S. Atomic Energy Commission	Mr. Leon A. Tarbox Engineering Branch Division of Construction and Supply U.S. Atomic Energy Commission 1901 Constitution Avenue NW Washington 25, D.C.	17 Sept. '56
U.S. Public Health Service, BUREAU OF STATE SERVICES	Mr. Charles D. Yaffee Occupational Health Field Hqs. U.S. Public Health Service 1014 Broadway Cincinnati, Ohio	21 Sept. '55
	Alternate: Mr. Edward Weiss Occupational Health Field Hqs. U.S. Public Health Service 1014 Broadway Cincinnati, Ohio	28 Sept. '55
U.S. Public Health Service, NATIONAL INSTITUTES OF HEALTH	Dr. Henry A. Imus National Institute of Neurological Diseases and Blindness Bethesda 14, Maryland	25 Sept. '54; Navy Council Rep. 2/17/53 to 10/18/54
Veterans Administration	Dr. Bernard M. Anderman Chief, Audiology and Speech Correction Physical Medicine and Rehabilitation Services Veterans Administration Washington 25, D.C.	16 Oct. '56

CALENDAR OF MEETINGS

6-7 June 1957	Fifteenth Council Meeting
28 October 1957	Sixteenth Council Meeting
29-30 October 1957	Fifth Annual Meeting
3-4 February 1958	Seventeenth Council Meeting

SUMMARY OF COUNCIL MEETINGS

Fifteenth Council Meeting: 6 and 7 June 1957, New York City.

The Final Report of Working Group 30 (Memorandum Report No. 3) was accepted by the Council, and the Group was discharged, its mission completed. Interim reports were received from Working Groups 22, 28, 31, and 32. The Council considered some of the problems involved in the preparation of final reports by Working Groups 28 and 29, and the Executive Secretary was requested to transmit the Council's decisions to the respective Chairmen.

Considerable time was spent in discussing the general form and content desirable in a final Working Group report. Frequently the Working Group's discussions lead to the development of ideas and concepts that go beyond the original assignment, but which are valuable in understanding and making use of the Working Group's recommendations. It is sometimes difficult to decide if such material should be included in the final report. Sometimes these ideas depart sufficiently from accepted and established beliefs that it may be impossible or improper to expect all members of the Working Group to approve them in the sense that they may later become part of the basis for official action or policy. The Council decided that the Working Group reports should usually be limited to the consensus of the Working Group on the question given them.

The Council next discussed the propriety of individual CHABA members writing interpretive or supporting articles based upon the recommendations of CHABA Working Groups. Such articles might serve to explain the recommendations to a wider audience, or might give wider circulation to important Working Group findings. The Council decided that two things may be done:

1. An explanatory article may be prepared by any CHABA member for publication under private authorship in a scientific journal. Such articles will include due reference to the basic CHABA Report, and to the membership of the Working Group. The Council will welcome such articles, and will review them prior to their submission for publication.
2. The Council may submit a CHABA Report for publication in its entirety by a suitable scientific journal, if a wider circulation is justified than is obtained through the CHABA membership.

Dr. Davis reported that he had guided the Final Report of Working Group 25 (CHABA Report No. 6) through its preparation,

owing to the illness of its Chairman, Dr. Hoople. Considerable explanatory material had been added to the decisions of the Working Group by Dr. Davis in the draft submitted to the Council for approval. In the light of the decisions mentioned above, Dr. Davis was requested to prepare a shorter, technical version of the Working Group report for circulation to the membership as CHABA Report No. 6. Dr. Davis was authorized to submit the longer draft to the A.M.A. Archives of Industrial Health as an article under the joint authorship of Drs. H. Davis, G. Hoople and H. O. Parrack.

The Armed Services members of the Council noted that CHABA has performed an unusual service in its four years of existence. The CHABA method of organization has proved to be an efficient way of providing specialized consultation services to the Armed Forces, and similarly organized committees may be established in other technical fields. CHABA has solved the immediate and pressing problems in its field, and those remaining will take longer to work out. Two such problems remaining are communication in noise, and the extra-auditory effects of noise.

Dr. J. C. R. Licklider was elected a Council Member at Large for a three year term to replace Professor Walter Rosenblith, whose term had expired.

Sixteenth Council Meeting: 28 and 30 October 1957, Washington, D.C.

The Final Report of Working Group 29, prepared in accordance with the Council's instructions, was accepted by the Council and the Group was discharged. Interim reports were accepted from Working Groups 22, 28, and 32. The Chairmen of Working Groups 22 and 28 were requested to submit their final reports as soon as possible. The Final Report of Working Group 25 (CHABA Report No. 6) was accepted by the Council and the Group was discharged. Working Group 31, which had planned the annual meeting program of 29 and 30 October 1957, was discharged.

The Council considered a request from Dr. Aram Glorig, the Director of the Subcommittee on Noise in Industry, for approval by the CHABA Council of the Guide for Conservation of Hearing in Noise which the Subcommittee has issued. The Council voted to "accept and approve" the Guide, as have the American Otological Society, the American Laryngological, Rhinological and Otological Society, the American Medical Association, and the Council of the Canadian Otolaryngological Society.

In consideration of the importance of rockets and missiles, and the rapid development which they are now undergoing, the Council agreed to investigate the possibility that a BENOX type survey of the problems in this area would be of value.

Dr. Eldredge, the Technical Aide, gave a short financial report which showed that the current CHABA expenditures were within budget limitations, and that the funds would, as planned, cover the contract year.

Dr. W. Dewey Neff, NRC Council Member, was elected Chairman of the CHABA Council for a two year term, replacing Capt. Clifford P. Phoebus, USN, Navy Council Representative, whose term had expired. Col. Charles S. Gersoni, Army Council Representative, was elected Deputy Chairman for a two year term, replacing Dr. Richard H. Bolt, whose term had expired.

Seventeenth Council Meeting: 3 February 1958, Dayton, Ohio, and
4 February 1958, Cleveland, Ohio.

The Council accepted a letter report from Working Group 28 as its final report, and discharged the Group. Interim reports were accepted from Working Groups 22 and 32.

The newly completed Air Force Bio-Acoustics Facility at Wright Air Development Center, Dayton, Ohio, was inspected by the Council. The Council's interest stemmed from the original recommendations made by CHABA to the Air Force favoring the construction of such a research facility. Members of the Facility staff gave a review of the present Air Force research program, and discussed the probable direction of future research.

On the second day of the meeting, the Council inspected some of the facilities of the National Advisory Committee of Aeronautic's Lewis Flight Propulsion Laboratory at Cleveland, Ohio. Here, the Council heard talks by several staff members concerning rocket propulsion.

The Council discussed various suggestions for the program of the 1958 Annual Meeting, and decided that the program should center around unsolved problems in bio-acoustics for which there is incomplete or conflicting evidence. The Annual Meeting will be held in Washington, D.C. on 28 and 29 October, 1958.

At the suggestion of the Navy Council Representative, the Council appointed Working Group 33 to define the bio-acoustic problems of rockets, missiles, and space travel. Col. Paul A. Campbell, the Air Force Council Representative, was appointed Chairman, and Drs. J. C. R. Licklider and W. D. Neff were also selected. The remainder of the membership will be chosen by these three initial members of the Working Group. The Council requested Working Group 33 to present a report at the Annual Meeting in October, 1958.

PROGRAM
FIFTH CHABA MEETING
Tuesday, 29 October

Morning

AHEHIN Study of the Effects on Naval Personnel
of High-Intensity Noise Hallowell Davis

Discussants: Nello Pace
Roland C. Davis
Lyle Jones
David Rioch
S. S. Stevens

Afternoon

Problems Encountered in Establishment of Criteria for
the Control of Noise Exposure

A. Based on Human Responses Walter A. Rosenblith
Discussant: William Burns

B. Based on the Response of Structural Material
and Electronic Components Ira Dyer

Discussants: H. H. Hubbard
C. T. Morrow

Current Status of the USAF Hearing Conservation
Program Ralph N. Kraus
Lt. Col., USAF (MC)

Wednesday, 30 October

Morning

Cutaneous Communication Possibilities Frank Geldard

Discussant: John F. Hahn

The Sonic Boom: Physical Characteristics and
Relation to Structures and Personnel Frank J. Leech
1st Lt., USAF
(presented by R. F. Thompson
Major USAF)

Afternoon

Working Group Reports

No. 29 "Instrumentation for Measuring and
Generating High-Intensity Noise"

L. L. Beranek

No. 30 "Jet Engine Noise Suppressors"

T. L. K. Smull

No. 32 "Criteria for Impulse Type Noise"

W. A. Rosenblith

Report of the Executive Secretary

Hallowell Davis

SUMMARY OF THE FIFTH

ANNUAL MEETING

Captain C. P. Phoebus, the retiring chairman of CHABA, introduced the new Chairman, Dr. W. Dewey Neff, elected by the Council for a two-year term. Captain Phoebus presided at the sessions on 29 October, Dr. Neff on 30 October.

In addition to the invited discussions there were, as usual, many informal questions and lively discussions by other CHABA members. At some of the previous CHABA meetings both the formal presentations and the subsequent discussions have been recorded, edited, circulated as a CHABA report and, in one case, published. The Council has decided, however, that the material of the Fifth Annual Meeting, although very valuable at the time in the form of personal presentations and live discussions, does not warrant the expense and effort of editing and printing - with the exception of the report on the ANEHIN Project by Dr. H. Davis. This report has now been accepted for publication by the Journal of Aviation Medicine, under the title "The Effects on Naval Personnel of High-Intensity Noise."

The ANEHIN Project was a three-year study, by Central Institute for the Deaf and the Naval School of Aviation Medicine, of flight deck personnel on carriers and maintenance personnel who service high-performance jet-powered aircraft. Methods for measurement of noise exposure and for rapid group audiometry were developed and studies carried out using audiometric, psycho-physiological and psychiatric methods. The major conclusions were:

"As of March 1957 there is no reasonable cause for immediate alarm concerning cumulative ill effects from the operational exposure of personnel to jet engine noise. We see no present need for changes in operational procedures or for protective equipment other than ear protectors of types that are currently available.

"We have no evidence that the criteria of 1957 for hazardous noise exposures should be made more strict, nor can we say with assurance that they are too lenient. They lie within the zone of uncertainty of our conclusions.

"Some of our findings suggest, but do not prove, that present operational exposures to jet engine noise may be near the limit of impairment of performance on a wide variety of psychological tests. With increased noise exposure these effects may become not only clearly measurable but also of practical medical or operational significance. Efforts should therefore be continued to establish clearly the limits of tolerance for noise exposure."

In the discussion both Dr. Lyle Jones and Dr. Roland C. Davis pointed out that analysis of co-variance would be a more powerful and appropriate technique than the method actually employed. This suggestion has been followed by the authors. The

original conclusions were reenforced by the new calculations, which are now incorporated in the final report. Drs. Pace and Rioch added stimulating comments on the physiological and the psychiatric methods, respectively, for the study of "stress".

Dr. William Burns, of Charing Cross Hospital, London, England, briefly reviewed the work now being done by the Royal Navy in the area covered by the ANEHIN Study. British efforts, he pointed out, were similar to the American ones, with very similar results. The Royal Navy, however, is taking every opportunity to indoctrinate its personnel with the necessity for wearing ear protection. The American V-51R ear plug has been standard issue for flight deck personnel until the recent introduction of the Mk-1 helmet which incorporates an ear muff using a liquid filled seal and an acoustic valve.

Problems of Criteria for the Control of Noise Exposure were discussed with respect to the effects of noise and vibration on humans and on structural material and electronic components. Prof. Rosenblith emphasized the difficulty of obtaining good field data and the impossibility of reproducing field conditions in the laboratory. Data on noise exposures are inadequate, but assumptions are nevertheless made in preparing tentative criteria. Ear protectors in the form of muffs are now more wearable. Monitoring audiometry has been introduced, and, if it is properly done, loss of hearing from exposure to high intensity noise should be greatly reduced. "The net result is," Prof. Rosenblith said, "that good data on the relation of hearing loss to noise exposure may never be obtained, but, instead, we may get rid of the problem. It is not clear in certain situations whether the more important objective should be to collect more good data or to enforce the present tentative criteria," he added.

Dr. Dyer reported that generally useful criteria did not exist for exposures of structural materials and electronic components to noise. However, the costs for skilled mechanics resulting from the failure of structures under acoustic and vibratory stress, in terms of dollars and man-hours, is a compelling reason for noise control. He defined the problem in terms of total physical environment in a way that closely parallels human environmental health problems. After describing specific testing techniques now in use, he discussed their limitations and some of the questions that remain unanswered. Dr. Hubbard elaborated on the practical and theoretical problems encountered in devising critical tests for specific conditions and in generalizing from the results of these tests. Dr. Morrow stressed the difficulties introduced by structural and electronic design changes. The human model does not change, basically, and information about it can easily be cumulative. The variable of design change often rules out the usefulness of "old" information when we try to establish useful criteria for electronic systems.

The actual performance of monitoring audiometry by automatic instruments at Lackland Field as part of the USAF Hearing Conservation Program was described by Col. R. N. Kraus and illustrated by a motion-picture. The methods appear to be practical and effective, and a significant number of otological

diagnostic problems have been identified among the new personnel tested. About half of these had only a unilateral loss and in only a few patients was the hearing loss felt to be noise-induced. Among the latter a history of exposure to blast or impact noise was frequently obtained. Col. Kraus advocated the measurement of noise for criterion purposes by standard sound level meters, but using the "A" or "3" weighting networks rather than octave band analysis. "The possibility of losing certain detailed information is practically outweighed by the greater probability of gaining useful information."

The Possibilities of Cutaneous Communication were presented by Dr. F. Geldard in a review of his own studies that he has summarized in the American Psychologist (1957, 12:115-124) under the title "Adventures in Tactile Literacy." Five vibrators are attached to the subject's chest in a wide array. The intensity and the duration (but not the frequency) of vibration are given in one of three grades (weak, medium or strong, etc.). A code for the alphabet is based on the various combinations of place, intensity and duration. A transmitter was developed, to be operated like a typewriter. The subjects, with a not unreasonable amount of practice, learned to receive messages in this code. The most proficient could receive about twice as fast as the standard speed for Morse Code. "Vibratees" is thus established as at least a possible alternate channel for the transmission of information under special circumstances.

Lt. Frank J. Leech was unable to attend the meeting. His paper, entitled "The Sonic Boom" was read by Major R. F. Thompson. It was a description of the physical characteristics of the sonic boom, the conditions under which the boom occurs, and some tentative generalizations based on investigation of particular instances. Further material was provided in discussion by Dr. H. O. Parrack. A sonic boom is a spectacular event and the legal aspects are a matter of real concern. There seem to be no well-substantiated effects on humans beyond possible tinnitus and perhaps "fullness in the ear." The cracking of glass is fairly common and some superficial damage may occur to structures, but there is no evidence of damage to main load-bearing members.

The afternoon of the second day was devoted to Working Group reports by Messrs Beranek (29), Smull (30), and Rosenblith (32) and the report of the Executive Secretary. All of these topics are covered in other parts of the present Annual Report.

Summary of Working Group Activities

WORKING GROUP 22 "Criteria for Hazardous Noise Exposures"

Status: Active

Requested by: Captain Edward H. Headley (MC) USA of the Environmental Health Laboratory, Army Chemical Center, by letter forwarded to the Council by Major Albrite on 15 April 1955. Modified by Council action to a joint Armed Services request on 5 Dec. 1955.

Purpose: To distinguish a hazardous from a non-hazardous noise exposure.

Membership:

Walter A. Rosenblith, Chairman

C. I. Barron
Aram Glorig
Gordon Hoople
Wayne Rudmose
H. Schuknecht

Air Force:

J. C. Carmichael, Lt. Col. (MSC)
H. von Gierke
Karl Kryter
R. F. Thompson, Major
C. N. Moss, Lt. Col. (MC)

Army:

R. Cramer
John R. Hall, Col. (MC)
Lee H. Miller, Capt. (MC) *
R. Edwin Shutts

Navy:

John F. Hyland
J. Siegel, Cdr. (MSC)
J. Webster

Meetings: 26 October 1955, Washington, D.C.
11-12 December 1955, Cambridge, Massachusetts
10 June 1956, Cambridge, Massachusetts
30 October 1956, Washington, D.C.

Activities:

The final report is in preparation. Inasmuch as the Working Group has already reported informally to the Air Force, and the recommendations have been incorporated in AFR 160-3 in the issue dated 29 October 1956, the report may be combined with the final report of Working Group 33. Working Group 33 is considering criteria for exposure to impulse type noise.

Reports:

- 1) Interim Report, 1 March 1956 (AFR 160-3 material)

Major Conclusions:

The criteria for long term hazardous noise exposures given in Volume II of the Handbook of Acoustic Noise Control, or derived from them by the equal-energy assumption for short term exposures, are consistent with present information. These criteria should be used on an interim basis.

* by invitation

WORKING GROUP 25
"Individual Audiometric Criteria"

Status: Discharged (28 October 1957)

Requested by: Dr. H. O. Parrack by letter dated 10 October 1955.

Purpose: To develop criteria for using audiometric information in relation to job assignment in a noise-hazardous situation.

Membership:

	Gordon Hoople, Chairman
Raymond Carhart	<u>Air Force:</u>
Hallowell Davis	J. C. Carmichael, Lt. Col. (MSC)
Aram Glorig	C. M. Kos
Thrift Hanks	R. M. Kraus, Lt. Col. (MC)
Ira Hirsh	C. N. Moss, Lt. Col. (MC)
John R. Lindsay	H. O. Parrack
Walter Rosenblith	
	<u>Navy:</u>
<u>Army:</u>	B. D. Casteel, Capt. (MC)*
John R. Hall, Col. (MC)	J. E. Rasmussen, Lt. (MSC)*
C. B. Meador, Col. (MC)	

Meetings: 20-21 November 1955, Chicago, Illinois
9 June 1956, Boston, Massachusetts

Activities:

The final draft of the Working Group report was prepared by the Secretariat and submitted to the Council at the June, 1957 meeting. At the Council's request, a shorter, more technical version was prepared by the Secretariat and was distributed to the membership as CHABA Report No. 6 "The Medical Principle of Monitoring Audiometry."

Reports:

Interim Report, 1 March 1956 (AFR 160-3 material)
CHABA Report No. 6 "Monitoring Audiometry and the Medical Disposition of Cases of Hearing Loss," June, 1957.

Major Conclusions:

Recommendations have been made to the Air Force regarding the medical disposition of persons showing various types and amounts of hearing loss when given audiometric tests.

WORKING GROUP 28
"Review of the Sociological and Socio-Psychological
Aspects of the Air Force Program for Research in
the Area of Community Reactions to Noise"

Status: Discharged (4 February 1958)

Requested by: The Council, 6 December 1955.

Purpose: To review the Sociological and Socio-Psychological Aspects of the Air Force Program for Research in the Area of Community Reactions to Noise.

Membership:

	Edwin B. Newman, Chairman
Raymond Bowers *	Howard Page
Daniel C. Camp *	H. O. Parrack
Launor Carter *	David Rioch
Amos H. Hawley *	W. A. Rosenblith

Meetings: 19 November 1956, Chicago, Illinois
1 February 1957, San Antonio, Texas

Activities:

A letter report was submitted by the Chairman to the Council meeting in February, 1958, which was accepted as the final report of the Working Group.

Reports:

Letter Report, dated 24 January 1958

WORKING GROUP 29
"Instrumentation for Measuring High-Intensity Noise"

Status: Discharged (28 October 1957)

Requested by: Captain Clifford P. Phoebus, 31 October 1956.

Purpose:

To prepare a report describing the characteristics and availability of high intensity noise generating and measuring equipment that is available either commercially or as special equipment developed by individual laboratories.

Membership:

	Leo L. Beranek, Chairman
John Hilliard	Isadore Rudnick
Elias Klein	Vincent Salmon

Meetings: 16 November 1956, Los Angeles, California

Activities:

The final report (Memorandum Report No. 4) was prepared under the editorship of Mr. George Kamperman, of Bolt, Beranek and Newman.

Reports:

Memorandum Report No. 4, "Instrumentation for the Measurement and Generation of High-Intensity Noise," September, 1957.

* by invitation

WORKING GROUP 30
"Jet Engine Noise Suppressors"

Status: Discharged (6 June 1957)

Requested by: Dr. H. O. Parrack, Air Force Council Representative,
30 October 1956.

Purpose:

To review the progress made in the field of jet engine noise suppression since the submittal of Memorandum Report No. 1 by Working Group 24 in May 1956.

Membership:

Leo L. Beranek
H. E. von Gierke

T. L. K. Smull, Chairman
Newell Sanders
P. J. Westervelt

Meetings: 26 February, Cleveland, Ohio

Reports:

Memorandum Report No. 3, "Estimate of Performance of Jet Engine Noise Suppressors for Flight Use," June, 1957

WORKING GROUP 31
"Program for the Fifth Annual CHABA Meeting"

Status: Discharged (28 October 1957)

Requested by: The Council, 31 October 1956.

Purpose: To plan the program for the Fifth Annual CHABA Meeting to be held 29-30 October 1957.

Membership:

D. H. Eldredge, Chairman
The planning is being conducted as a Secretariat activity.

Reports:

Program for the Fifth. Annual Meeting, 29-30 October 1957

WORKING GROUP 32
"Criteria for Impulse Type Noise"

Status: Active

Requested by: Letter from Col. C. S. Gersoni dated 28 November 1956 forwarding the request of Lt. Col. Joseph R. Blair, Commander, Army Medical Research Laboratory. Modified to a joint Armed Services request on 29 January 1957.

Purpose: To distinguish between a hazardous and a non-hazardous exposure to impulse noises.

Membership:

Jerome R. Cox *	Walter A. Rosenblith, Chairman
Aram Glorig	<u>Army:</u> Capt. John L. Fletcher (MSC) Merle Lawrence
<u>Air Force:</u> Col. Paul A. Campbell (MC)	<u>Navy:</u> J. Donald Harris

Meetings: 25 May 1957, New York City
10-11 October 1957, Fort Knox, Kentucky

Activities:

A demonstration firing of various heavy weapons was witnessed by the Working Group at Fort Knox. A significant number of cases of acoustic trauma are reported at the Fort Knox Station Hospital. The nature of the trauma and the conditions of exposure will be investigated. The Working Group considered the potentialities of the Army's blast tubes for research on impulse and blast phenomena. A subcommittee has met to organize and prepare the rough draft of the final report. The outline for the report has since been revised by Prof. Rosenblith and Dr. Eldredge, and is being circulated to the WG for approval.

WORKING GROUP 33

"Bio-Acoustic Aspects of Rockets, Missiles, and Space Travel"

Status: Active

Requested by: Joint Armed Services request on 4 February 1958

Purpose: To determine the bio-acoustic problems that may be associated with rockets, missiles, and space travel.

Membership:

Col. Paul A. Campbell, USAF (MC) Chairman	
J. C. R. Licklider	<u>Army:</u>
W. Dewey Neff	Col. C. L. Gersoni (MSC)
T. L. K. Smull	Frederick Guedry
<u>Air Force:</u>	<u>Navy:</u>
H. O. Parrack	Robert S. Gales
H. E. von Gierke	Capt. Clifford P. Phoebus (MC)

Meetings: 7 March 1958, New York City
15 May 1958, Washington, D. C.

Activities:

The second meeting of the WG occurred during a four-day symposium on the possible uses of earth satellites in the study of the life sciences. Members of the WG attended the symposium for background briefing on problems in the WG's field of interest.

The WG concluded that its assignment fell into four areas. These concern the problems that arise in rocketry during a) static test, b) launch, c) cruise in space, and d) reentry into the earth's atmosphere. Answers to the problems in each area will be in two parts, one for rockets and one for satellites. Eight questions, to be applied to each of the four areas given above, were prepared by the WG. The answers to these questions will be presented to the CHABA Annual Meeting in October 1958, as an interim report. The WG has invited Dr. Frederick C. Frick of Lincoln Laboratories, Lexington, Massachusetts to talk about one of the eight questions, and has invited Dr. Uno Ingaard to speak on the remaining points.

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Other Activities of the Secretariat

During the summer months the Secretary for the Working Groups edited, duplicated, assembled, and distributed various reports to the CHABA membership. The Fourth Annual Report, the Final Report of Working Group 25 ("Monitoring Audiometry and the Disposition of Cases of Hearing Loss"), Memorandum Report No. 3 (Estimate of Performance of Jet Engine Suppressors for Flight Use), Memorandum Report No. 4 ("Instrumentation for the Measurement and Generation of High Intensity Sound"), and a CHABA membership list were included.

The Secretariat made recommendations to the CHABA Navy Representative in a letter dated 27 September 1957 concerning the problem of the nesting and flight of gooney birds on and around the Naval airfield on Midway Island. Based upon correspondence with Dr. Hubert Frings of Pennsylvania State University, Dr. Robert Galambos of Walter Reed Army Medical Center, and Dr. Donald Griffin of the Harvard University Biological Laboratories, the Navy Representative was advised that the only acoustic sounds that seem to be of value in controlling the flight and nesting habits of birds were food and distress calls, of the kind that have been recorded by Dr. Frings. With these calls, birds can be made to move into or away from a given area so long as the calls are present. The Navy Representative subsequently informed the Secretariat that a contract has been given to Dr. Frings by the Bureau of Aeronautics to record the necessary calls, in an attempt to control the activities of the gooney birds on Midway Island.

The material derived by the Secretariat from CHABA Report No. 5, "The Testing of Hearing in the Armed Services" has been printed in the December 1957 issue of the Journal of Speech and Hearing Disorders as two articles. The first, "What is Zero Hearing Loss?" (22: 662-690, 1957) is by Drs. Hallowell Davis and

J. Richardson Usher, and the second is "Problems in Military Audiometry" (22: 729-756, 1957) by Dr. Usher.

The longer, more explanatory version of the Working Group 25 Report was printed in the A.M.A. Archives of Industrial Health (17: 1-20, 1958) as an article entitled "The Medical Principles of Monitoring Audiometry" by Drs. Hallowell Davis, Gordon Hoople, and H. O. Parrack.

On 27 April 1958 Dr. Davis, the Executive Secretary, reported on CHABA activities and prospects to the Governing Board of the National Research Council. He stated that the group of original military problems on hearing and bio-acoustics that had led to the establishment of CHABA in 1951 have now been reviewed and analyzed, and some interim solutions have been suggested. Prominent among the early problems were the reaction of communities to aircraft noise, and injury to hearing and other possible harm from exposure to high-intensity noise. A major practical demand was for criteria. CHABA has helped contribute to the clear recognition of the time factor in noise exposure, the stimulation of development of better instruments for measurement of high-intensity noise and noise exposure and the use of such instruments, and the crystallization of the concept of the monitoring of personnel who work in acoustically hazardous situations. CHABA has also provided opinions or guidance on a number of more restricted specific bio-acoustic problems, and has given some attention to the difficulties of auditory communication in noise. Some of CHABA's major problems may be solved at the practical level by judicious compromises based on good physical measurements and the information gleaned from systematic, well-placed monitoring programs. Much of the original sense of urgency has now abated and CHABA anticipates a period of a lower level of continuing activity. Dr. Davis advised the Governing Board that next year a new Executive Secretary must be found, as well as a new location for the Secretariat. The Governing Board seemed to clearly recognize the value of organizations such as CHABA, the Vision Committee, and the proposed Committee on Bio-Astronautics for inter- and extra-service communication, for morale, for practical advice, and for stimulation of and evaluation of long-term research.

REPORTS

The following is a cumulative list of the reports prepared and distributed by the Committee on Hearing and Bio-Acoustics.

A. CHABA Reports:

1. "High Intensity Noise and Military Operations: An Evaluation." 25 January 1954. CHABA Report No. 1. Technical Report No. 1 to the Office of Naval Research from the Central Institute for the Deaf, Contract No. Nonr 1151 (01), NR 140-069.
2. "The Effects of Blast Phenomena on Man," by D. H. Eldredge, 1 September 1955, CHABA Report No. 3. Technical Report No. 4 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.
3. "Noise and the Community" - The Proceedings of the Second Meeting of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics, a joint meeting with the National Advisory Committee for Aeronautics special Subcommittee on Aircraft Noise, 25-26 October 1954, October, 1955, CHABA Report No. 4. Technical Report No. 5 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-169.
4. "The Testing of Hearing in the Armed Services" - The Proceedings of the Third Annual Meeting of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics, 25-26 October 1955. 1 June 1956, CHABA Report No. 5. Technical Report No. 3 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01), NR 140-069.
5. "Monitoring Audiometry and the Medical Disposition of Cases of Hearing Loss," Final Report of Working Group 25. June, 1957, CHABA Report No. 6. Technical Report No. 11 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01), NR 140-069.

B. Memorandum Reports

1. "Evaluation of Methods for Reducing Noise from Jet Engines in Flight," Final Report of Working Group 24. May, 1956, CHABA Memorandum Report No. 1. Technical Report No. 6, to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01), NR 140-069.
2. "Hearing Conservation Data and Procedures," Final Report of Working Group 21. June, 1956, CHABA Memorandum Report No. 2. Technical Report No. 7 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.

3. "Estimate of Performance of Jet Engine Noise Suppressors for Flight Use," Final Report of Working Group 30. June, 1957, CHABA Memorandum Report No. 3. Technical Report No. 13 to Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.
4. "Instrumentation for the Measurement and Generation of High Intensity Sound," Final Report of Working Group 29. September, 1957, CHABA Memorandum Report No. 4. Technical Report No. 14 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.

C. Annual Reports:

1. First Annual Report of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics. 1 June 1954, CHABA Report No. 2. Technical Report No. 2 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.
2. Second Annual Report of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics. 1 June 1955. Technical Report No. 3 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.
3. Third Annual Report of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics. 1 June 1956. Technical Report No. 9 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.
4. Fourth Annual Report of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics. 1 June 1957. Technical Report No. 10 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.

REPORTS NOW IN PREPARATION

A. CHABA Reports:

1. Final Report of Working Group 22. (Title not yet selected.) CHABA Report No. 7. Technical Report No. 12 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.
2. Final Report of Working Group 32. (Title not yet selected.) CHABA Report No. 8. Technical Report No. 16 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.

B. Annual Reports:

1. Fifth Annual Report of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics. Technical Report No. 15 to the Office of Naval Research from the Central Institute for the Deaf, Contract Nonr 1151 (01) NR 140-069.

CHABA MATERIAL PUBLISHED IN JOURNALS

1. Glorig, A., and Quiggle, R., "A Hearing Conservation Data Card," Noise Control, 6: 34-42, November, 1956.
2. "Recent Progress in Hearing and Bio-Acoustics," Fourth CHABA Meeting. The speeches of Major General Silas B. Hayes, MC, USA, Brig. General Marvin C. Demler, USAF, and Rear Admiral Rawson Bennet, II, USN. Noise Control, 3: 39-44, May, 1957.
3. The CHABA Statement of Purposes and Methods of Operation, Noise Control, 3: 53-54, November, 1957.
4. Davis, H., and Usher, J. R., Eds., "What is Zero Hearing Loss?", Journal of Speech and Hearing Disorders, 22: 662-690, 1957.
5. Usher, J. R., Ed., "Problems in Military Audiometry," Journal of Speech and Hearing Disorders, 22: 731-756, 1957.
6. Davis, H., Hoople, C., and Parrack, H. O., "The Medical Principles of Monitoring Audiometry," AMA Archives of Industrial Medicine, 17: 1-20, 1958.